
Space Weather Forecast

Issued on Thursday, 22 December 2022 at 01:24 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of Moderate-class X-ray flares and Minor Geomagnetic Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low, with occasional Common Class flares, the largest at 21/ 0621 UTC from a region which has now rotated onto the far side. Most remaining flares originated from AR3169, which is an elongated group in the northeast quadrant with a series of relatively small leader spots, but no penumbra now on the trailer spots. There is some magnetic complexity, which is further complicated by AR3171 which follows close behind AR3169 and also has some magnetic complexity. The split between these two regions is difficult to determine. A small region in the southeast has also had some C-flare activity, despite it's simple magnetic structure and weak appearance. Another region, which is approaching the southwest limb has seen fading of its trailing spots and it remains inactive so far. The remaining regions are all small, magnetically simple, weak and relatively stable.

A narrow CME occurred near AR3169 associated with a Common class flare at 21/0519 UTC, which may give a glancing blow late on the 23rd. No other Earth directed CME's were observed.

Solar Wind / Geomagnetic Activity: Solar winds have been indicative of an early possible weak transient feature passing Earth, likely due to glances from a CME, followed by a weak disturbance ahead of a slight solar wind enhancement. Solar wind speeds were at background to slightly elevated levels, peaking at 431 km/s at 21/1426 UTC. The strength of the magnetic field was Moderate for much of the day, but later declined to end the day at weak levels. The important north-south component was also weak to moderate, oscillating between southward and northward. Geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: The count rate of observed energetic particles (high energy protons) remained at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low to Moderate, with occasional Common-class flares and an ongoing chance of isolated Moderate-class flares. The most likely source is either the large sunspot in the southwest, or the two sunspots in the northeast. These also bring a very slight chance of Strong class flares.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs expected. Solar winds are forecast to become elevated later on Day 1 or early Day 2 (21-22 Dec) due to the arrival of the fast wind from a coronal hole. Ongoing fast winds are then expected with a succession of coronal holes moving across the disc. Wind speeds are likely to remain at slightly elevated or elevated levels for the rest of this period.

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Quiet to Unsettled geomagnetic activity at first, is expected to become Unsettled to Active later on Day 1 or early Day 2, with a chance of isolated Minor Storm intervals. This chance decreases a little into Day 3 (23 Dec), before increasing slightly again on Day 4 (24 Dec) as a somewhat larger coronal hole is likely to give slightly stronger wind speeds.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to persist at background levels with no solar radiation storms occurring. However, there is a slight chance of the count rate increasing with any notable flares, potentially reaching the S1/Minor Radiation Storm level.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	20	30	30	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

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Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm ⁻² sr ⁻¹ s ⁻¹)						